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ABSTRACT

Comparisons between sport-related injuries for male and female athletes are discussed in relation to statistics gathered by the National Athletic Injury/Illness Reporting System (NAIRS) and other sources. Tables display data on: (1) athletic injuries and fatalities in colleges and universities by sport, 1975-76; (2) average annual frequency of significant injuries for selected collegiate sports, 1975-78; (3) rate and percentage of significant injuries in women's collegiate gymnastics associated with apparatus, 1975-78; (4) number of injuries by sport for females; (5) leading cause of injury by sport for females; (6) injuries in boys' and girls' sports (Oklahoma High School); (7) women's and men's reportable and significant injuries for game- and practice-related activities; (8) average annual rate and proportion of significant injuries in selected collegiate sports, by selected body part and indices of severity, 1975-78; (9) men's and women's reportable and significant injuries according to body part; (10) incidence, mean age, and average weekly training mileage according to anatomical location of injury for runners; (11) women's and men's reportable game- and practice-related injuries according to type; (12) average annual rate and proportion of significant injuries in selected collegiate sports by type of injury, 1975-78; and (13) incidence of ten most common injuries for runners by sex. In a discussion of these statistics, the importance of physical conditioning for the female athlete is emphasized, as well as the responsibilities of the athletic coach in preventing injuries and treating them competently. (JD)

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SPORT INJURIES FOR FEMALES: INCIDENCE AND PREVENTION

The probability of injury for sport participants is high. An athlete has a 50-50 chance of receiving an injury (1:228). Approximately 90-95 percent of these injuries are minor contusions and muscle pulls. The remaining 5-10 percent often result in surgical intervention, extended rehabilitation, permanent neurological or joint damage, or even death.

In an American College Health Association Survey (2), 52 percent of all injuries in college occurred in athletics and recreation. A recent study conducted at the University of Georgia Health Service during the first six months of 1981 showed that 46 percent of the injuries reported occurred in sports (3:15). These data do not reflect the injuries in athletics which were not reported to the Health Service.

Historical Perspective of Sport Injury Surveillance

Surveillance of sport injury is extremely difficult:

1. Mere description of injuries sometimes requires special knowledge.
2. Nomenclature and definitions are problematic.
3. Willingness to report accidents is often a problem.
4. Record keeping is tedious and time consuming.

These and other problems are certainly factors in the scant data available from public schools and colleges prior to the 1970's.

Several exceptions should be noted:

1. Football injury data have been plentiful.
2. Two states, Louisiana (1967) and Kansas (1934), have had statewide accident reporting systems for 15 and 48 years respectively (4:16-18).
3. The University of Minnesota and Michigan State University operated statewide accident reporting systems for college and universities (4:19-21).
4. Insurance companies have data on injuries.

In the past decade, increased participation in sports, increased litigation related to sport, and increased sensitivity to the risks involved in human endeavors are factors that nudged national interest in sport injuries. Congress passed a law in 1975-76 (Public Law 93-380) that mandated a study of sport injuries in colleges and universities. The study was conducted under the auspices of the Department of Health, Education, and Welfare (HEW) and the results were released in 1979. The HEW study was the first attempt at a national surveillance of sport injuries and resulted in the National Athletic Injury/Illness Reporting System (NAIRS), a non-profit organization, that works closely with the National Athletic Trainers Association (4:22).

Comparison of Sport Injuries for Males and Females

The data selected to illustrate the incidence of injury for males and females were collected after 1972 when Title IX of the Higher Education Amendments was effected. Therefore, they

reflect at least some of the increased female participation in athletics. The NAIRS data as well as data from other surveys will be used to compare sport injuries for males and females. Suffice it to say, the data you will see today are incomplete, especially as they are related to injuries in the public schools. They are sufficient, however, to give an overview of trends, to indicate high risk areas, and to focus our attention on control efforts.

Comparisons between males and females will be made for:

1. Type of participation
2. Comparable sports
3. Practice-related, Game-related injuries
4. Body part injured
5. Type of injuries

Type of Participation (Table 1)

That most injuries occur in athletics will come as no surprise to most of you. An additional category that would be of interest to me is the "unorganized" category; e.g. pick-up games. Dr. Harwood at the University of Georgia indicated that more serious accidents per capita occurred in unorganized than in organized sport (3:14). Our interest, however, lies primarily in activities that we plan and conduct. Injuries in intramurals and physical education are relatively few.

Injuries in comparable sports for females and males (Table 2)

The incidence of injury for females was greater than for males in gymnastics, basketball, softball-baseball, and track and field. Field hockey was safer for women than was soccer for men

Table 1. Athletic Injuries and Fatalities¹ in Colleges and Universities, by Sport, 1975-76

Sports Category	<u>Two-Year Colleges</u>		<u>Four-Year Colleges</u>	
	MEN	WOMEN	MEN	WOMEN
Athletics Tackle				
Football	64.2	—	94.9	—
Athletics, other				
contact sports	27.3	21.2	50.7	23.1
Athletics, noncontact				
sports	13.5	13.0	22.7	17.7
Intramurals	1.6	1.3	1.6	1.5
Physical Education	0.9	0.8	0.8	0.4

¹Per 100 participants

Source: NAIRS Data, Calvery and Clarke (5:449)

Table 2. Average Annual Frequency of Significant Injuries¹,
Selected Collegiate Sports, 1975-78, NAIRS Data

Sport	Annual Teams Followed	Significant Injuries	
		Per 1,000 Athlete Exposures ²	Per 100 Athletes
I. Spring Football (M)	26	6.3	12.6
II. Wrestling (M)	20	4.2	35.7
Fall Football (M)	49	3.0	25.0
Gymnastics (W)	9	2.7	28.4
Ice Hockey (M)	8	2.5	26.9
Basketball (W)	21	2.5	20.3
Lacrosse (M)	5	2.5	11.7
III. Soccer (M)	13	2.3	13.2
Track and Field (W)	8	2.2	12.0
Basketball (M)	31	2.1	20.7
Volleyball (W)	16	2.1	10.9
Track and Field (M)	14	1.9	10.0
Softball (W)	10	1.8	8.7
IV. Gymnastics (M)	6	1.5	16.4
Baseball (M)	13	1.3	9.2
Field Hockey (W)	16	1.0	5.5
V. Tennis (W)	5	0.6	5.7
Swimming and Diving (M)	7	0.6	4.0
Swimming and Diving (W)	7	0.2	2.3

¹At least one week participation missed.

²Number of athletes times number of sessions.

Source: Calvert and Clarke, 1979 (5:457).

and swimming and diving was safer for women than men. Some would correctly argue that comparisons in some of these activities are unjustified because the activities are different for the sexes.

A breakdown of injuries in women's gymnastics events may be of interest, (Table 3). Overall, free exercise was plagued with the most injuries. The dramatic increase in injuries on the beam and unevens in 1976-78 may be associated with spectacular Olympic exhibitions. Women may have attempted exercises for which they and the coaches were unprepared. Or perhaps the events in women's gymnastics are inherently more dangerous than men's events. The same argument would not hold true for basketball, track and field, or softball-baseball where the activities are similar. Rather, causative factors may be more related to levels of skill, conditioning, coaching competence, and anatomical structure differences.

The data from Ritter (Tables 4 and 5) also show a greater number of injuries in gymnastics with tumbling as the activity in which most of the accidents occurred. These data support the NAIRS data.

Data from a representative sample of high schools in Oklahoma revealed a rate of injury of about 2.5 per 100 participants for both boys and girls (Table 6). Injuries in track were greater for boys than for girls, but there were more soccer and basketball injuries for girls than for boys.

Table 3. Rate and Percentage of Significant Injuries in Women's Collegiate Gymnastics Association with Apparatus, 1975-78 NAIRS Data

Activity	1975-76		1976-77		1977-78	
	(N = 11 Teams)		(N = 5 Teams)		(N = 11 Teams)	
	Rate ^a	%	Rate	%	Rate	%
Free Exercise	12.1	59	3.6	25	12.1	33
Balance Beam	3.0	15	3.6	25	8.3	23
Unevens	2.4	12	2.4	38	9.1	25
Vault	3.0	15	3.0	13	6.1	17
Trampoline	0	0	0	0	0.8	2

Source: Calvert and Clarke (5:458)

Note: Rate = number of injuries per 100 athletes.

Table 4. Number of Injuries by Sport for Females

Sport	Number of Participants	Number of Injuries	Percent of Total Number of Injuries
Field Hockey	20	43	16.8
Basketball	20	33	12.9
Gymnastics	22	102	39.8
Volleyball	15	59	23.1
Tennis	12	8	3.1
Softball	16	11	4.3

Source: Ritter et al (6:267)

Table 5. Leading Cause of Injury by Sport for Females

Sport	Activity	Number of Percent of This	
		Injuries	Sport's Injuries
Field Hockey	Defense	13	30.2
	Running	10	23.3
Basketball	Guarding	9	27.3
Gymnastics	Tumbling	53	52.0
Volleyball	Heat Problems	12	20.3
	Dive-roll	11	18.6
Tennis	Running	6	75.0
Softball	Running	4	36.4
	Sliding	3	27.3

Source: Ritter, et al (6:268).

Table 6. Injuries in Boys' and Girls' Sports (Oklahoma High School)

Sport	Boys			Girls		
	Participants	No. Injuries	Rate/1,000	Participants	No. Injuries	Rate/1,000
Track	1,682	28	16.6	1,141	8	7.0
Cross-Country	389	9	23.1	187	0	0
Swimming	233	1	4.2	165	5	30.3
Tennis	430	0	0	457	3	6.6
Volleyball	19	0	0	429	2	4.6
Soccer	118	1	8.5	50	1	20.0
Basketball	1,638	98	59.8	1,605	105	65.4
Baseball/Softball	1,969	28	14.2	773	9	11.6
Total	6,478	165	25.4	4,807	133	27.7

Source: Shively et al. 1981 (7:48)

Practice and game related injuries (Table 7)

Each report reviewed indicated that practice-related injuries are greater than game-related injuries. This finding is not surprising since many more hours are spent and more participants are engaged in practices than in games. Consider also that the injury-prone individuals, for whatever the reason, have a greater chance for injury prior to a true contest. About twice the number of injuries for both males and females occur in practice as occur in games, or about two-thirds of all accidents occur during practice.

Body part injured (Tables 8, 9, and 10)

When the body part injured is examined, females have more injuries to the lower extremity than do males. Additionally females tend to have more low back injuries than males.

The literature reviewed clearly laid one myth to rest. Injuries to the breasts of females occurred with less frequency than injury to any other part of the body.

Type of injury (Tables 11, 12, and 13)

Females have a greater incidence of sprains, tibialis stress syndrome, and patellofemoral stress syndrome. Males tend to have more fractures and inflammation-type injuries than do females. The percentage of other types of injuries are similar for males and females.

Table 7. Women's and Men's Reportable and Significant Injuries for Game- and Practice-Related Activities*

	Game-Related				Practice-Related			
	Reportable		Significant		Reportable		Significant	
	No.	R	No.	R	No.	R	No.	R
WOMEN								
Basketball	130	26.7	38	0.8	241	16.4	75	5.2
Gymnastics	16	15.2	10	10.3	79	8.2	37	3.7
Softball	21	1.2	7	0.4	55	8.6	19	3.3
MEN								
Basketball	179	22.6	61	7.5	380	14.0	90	3.6
Gymnastics	19	16.4	12	10.4	76	6.8	37	2.1
Baseball	57	2.0	15	0.5	76	4.1	39	2.0

*Injuries that occurred during a scrimmage are not shown.

Source: Whiteside, 1980 (8:132)

Table 8. Average Annual Rate and Proportion of Significant Injuries Selected Collegiate Sports, by Selected Body Part and Indices of Severity, 1975-78, NAIRS Data

Injury	Base-		Soft-		Field					
	<u>ball</u>		<u>ball</u>		<u>Basketball</u>		<u>Gymnastics</u>		<u>Soccer</u>	
	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women
Body Part										
Head-neck-spine	0.2	0.3	0.1	0.5	0.8	0.0	0.3	0.1	0.1	0.0
	2%	4%	1%	3%	5%	0%	2%	2%	1%	0%
Lower extremity	3.4	3.5	14.3	16.6	5.4	19.0	10.1	4.0	7.2	11.1
	37%	40%	9%	82%	33%	57%	76%	72%	72%	92%
Knee	0.6	1.7	4.5	5.9	2.3	7.7	3.6	1.7	1.3	1.4
	7%	19%	22%	29%	14%	27%	27%	32%	13%	12%
Severity										
Major injury ¹	2.7	4.5	8.1	9.0	9.6	17.6	4.5	1.3	4.6	5.0
	29%	52%	39%	44%	59%	62%	34%	23%	46%	42%
Surgery	0.9	0.2	1.8	1.7	1.1	3.4	1.0	0.3	0.6	0.3
	10%	2%	9%	9%	7%	12%	8%	5%	6%	2%

¹Sport disability of greater than three weeks.

Source: Calvert and Clarke (5:460)

Note: Rate = number of injuries per 100 athletes. "Significant" and "Major injury" are defined as an injury that sidelines the participants for at least three weeks.

Table 9. Men's and Women's Reportable and Significant Injuries According to Body Part*

	Head/ Neck/Spine		Face/ Scalp		Shoulder/ Arm		Forearm/ Hand		Torso		Hip/Leg		Knee		Ankle/Foot	
	No.	R	No.	R	No.	R	No.	R	No.	R	No.	R	No.	R	No.	R
WOMEN																
Basketball																
Reportable	12	0.6	32	1.8	3	0.2	31	1.4	15	0.7	66	3.2	57	2.9	166	8.7
Significant	3	0.1	10	0.6	0	0.0	6	0.3	2	0.1	12	0.6	34	1.7	49	2.5
Gymnastics																
Reportable	1	0.1	0	0.0	8	1.0	26	4.2	12	1.1	8	0.9	18	0.9	30	2.7
Significant	0	0.0	0	0.0	3	0.6	9	1.1	4	0.3	12	0.1	12	1.1	20	2.0
Softball																
Reportable	8	0.3	1	0.0	15	0.6	21	0.8	1	0.0	7	0.3	11	0.4	12	0.4
Significant	1	0.1	0	0.0	7	0.3	8	0.7	0	0.0	1	0.0	5	1.0	4	4.2
MEN																
Basketball																
Reportable	13	0.4	61	1.8	13	0.4	40	0.9	35	0.8	91	2.7	86	2.3	217	6.1
Significant	1	0.1	21	0.6	6	0.2	10	0.2	8	0.2	17	0.5	38	1.0	52	1.520
Gymnastics																
Reportable	8	0.6	1	0.1	17	1.3	26	2.1	13	1.0	3	0.2	9	0.8	18	1.6
Significant	3	0.2	1	0.1	9	0.6	15	1.2	5	0.4	1	0.1	7	0.6	8	0.6
Baseball																
Reportable	12	0.2	33	0.9	24	0.5	29	0.6	14	0.3	54	1.3	9	0.2	21	0.4
Significant	2	0.0	2	0.0	15	0.4	10	0.2	3	0.1	6	0.1	4	0.1	10	0.2

*Some areas of the body are not shown due to the low number of injuries sustained.

Source: Whiteside, 1980 (8:135)

Table 10. Incidence, Mean Age, and Average Weekly Training Mileage According to Anatomical Location for Runners

Location	Total	Men	Age		Women	Age	
	Injuries	No.	(yr)	Mileage	No.	(yr)	Mileage
Lower back	68	36	32	22	32	28	20
Hip	90	45	31	28	45	28	22
Upper Leg	66	38	28	31	28	24	27
Knee	761	458	29	22	303	25	20
Lower Leg	503	292	32	25	211	27	20
Foot	331	212	30	25	119	27	20
Total	1,819	1,081	—	—	739	—	—
Mean	—	—	30	27	—	26	19

Source: Clement, et al. May, 1981 (9:50)

Table 11. Women's and Men's Reportable Game- and Practice-Related Injuries According to Type*

Game-Related										
General										
Trauma		Neurological		Sprain		Strain		Fracture		
No.	R	No.	R	No.	R	No.	R	No.	R	
WOMEN										
Basketball	28	6.4	3	0.6	75	5.2	13	2.0	7	1.4
Gymnastics	1	0.5	0	0.0	10	13.8	3	3.2	0	0.0
Softball	3	0.2	6	0.3	6	0.3	3	0.2	3	0.2
MEN										
Basketball	52	6.4	3	0.4	85	10.7	16	1.9	13	1.7
Gymnastics	2	1.8	0	0.0	8	6.8	6	4.4	3	3.5
Baseball	17	0.6	3	0.1	21	0.7	10	0.3	2	0.1
Practice-Related										
WOMEN										
Basketball	48	3.0	8	0.6	117	8.2	43	2.6	20	0.9
Gymnastics	16	1.0	1	0.1	42	4.5	10	2.0	6	0.4
Softball	12	1.9	3	0.6	18	3.0	16	2.4	5	0.7
MEN										
Basketball	115	4.4	9	0.3	160	5.7	48	1.7	25	0.9
Gymnastics	16	1.4	3	0.2	30	2.6	16	1.3	8	0.8
Baseball	18	0.9	5	0.3	20	1.1	21	1.2	2	0.1

*Injuries that were not sports-related are not shown

Source: Whiteside, 1980 (8:135)

Table 12. Average Annual Rate and Proportion of Significant Injuries Selected Collegiate Sports, by Type of Injury, 1975-78 NAIRS Data

Injury	Base-	Soft-	Basketball		Gymnastics		Field		Track & Field	
	ball	ball	Men	Women	Men	Women	Soccer	Hockey	Men	Women
	Men	Women					Men	Women		
Neurotrauma	0.1	0.3	0.1	0.4	0.3	0.0	0.2	0.2	0.1	0.0
	1%	4%	1%	2%	2%	0%	1%	4%	1%	0%
Sprains	3.4	3.5	11.1	11.8	6.8	18.8	6.5	2.0	1.8	2.0
	37%	40%	54%	58%	41%	66%	49%	37%	18%	16%
Strains	2.6	1.0	1.3	0.8	4.2	4.8	1.6	1.2	4.8	3.1
	28%	12%	6%	4%	26%	17%	12%	21%	48%	46%
Fractures	0.6	2.2	2.9	3.0	2.8	3.7	1.2	0.4	0.5	2.2
	7%	25%	14%	15%	17%	13%	9%	7%	5%	19%
Dental Fractures	0.2	0.2	1.7	1.2	0.0	0.0	0.3	0.4	0.1	0.1
	3%	2%	8%	6%	0%	0%	3%	7%	1%	1%
Chronic Orthopedic	0.5	0.3	1.3	1.1	0.6	0.9	0.3	0.5	0.8	0.7
	5%	4%	6%	6%	3%	3%	3%	9%	8%	6%
Other	1.8	1.2	1.8	1.9	2.3	2.3	2.9	2.9	1.8	3.9
	19%	13%	9%	10%	14%	8%	22%	16%	18%	33%

Source: Calvert and Clarke (5:459)

Note: Rate = number of injuries per 100 athletes.

Table 13. Incidence of the Ten Most Common Injuries for Runners

Injury	Men		Women		Total	
	%	No.	%	No.	%	No.
Patellofemoral pain syndrome	24.3	262	27.9	206	25.8	468
Tibial stress syndrome	10.7	115	16.8	124	13.2	239
Achilles peritendinitis	7.9	85	3.2	24	6.0	109
Plantar fasciitis	5.3	57	3.9	28	4.7	85
Patellar tendinitis	5.6	60	2.8	21	4.5	81
Iliotibial band friction syndrome	4.6	50	3.8	28	4.3	78
Metatarsal stress syndrom	3.3	36	3.0	22	3.2	58
Tibial stress fracture	2.4	26	2.8	21	2.6	47
Tibialis posterior tendinitis	1.9	21	3.2	24	2.5	45
Peroneal Tendinitis	2.0	22	1.6	12	1.9	34
Total	68.0	734	69.0	510	68.7	1,244

Source: Clement, et al. May, 1981 (9:50)

Etiology of Injuries

To know the incidence of injuries, the high-risk sports, and the body part affected are informative, but the information is of little value unless it provides an understanding that will help identify factors related to injury. Only when we understand related factors can we reduce the number and severity of injuries.

For many years, prevailing medical opinion indicated that vigorous, and stressful competitive sports would harm the delicate female. The works of Klaus (10) supported those opinions when he reported the incidence of injury to women in athletics was almost double that of men. Even some renowned exercise physiologists concluded that most athletics were not suitable for the female's musculoskeletal system.

"Project 60", conducted by the United States Military Academy's Office of Physical Education in 1976-77, was probably the most influential research that destroyed the "fragile female" myth (11:32). Sixty-three (63) women volunteers were subjects in three groups: a control group, a 4-day-a-week reveille exercise group that included calisthenics, rifle drill, and running identical to the male cadets; and a 3-day-a-week strength training program. As a whole, the injury rate was higher for females than for male cadets. The most significant finding, however, was that none of the women who scored very high on the original fitness tests incurred any injuries during training. Obviously, the level of fitness affected the female's susceptibility to injury.

Being female does not cause injury. True, there are a few injuries unique to females. Haycock (12:165) reported isolated incidences of vulva lacerations, abrasions caused by hooks and eyes on bras, breast contusions, which are rare, thrombosed vessels, and phlebitis believed to be associated with birth control pills, and a perforated uterus by an intrauterine device caused by a blow to the pelvis. With little effort, a rather accurate list of injuries unique to males could be compiled, but, likewise, being male did not cause the injury.

The data presented herein on the incidence of injury further destroy the myth. Injuries are sport-related, not sex-related.

One of two factors usually causes injuries in sport: 1) force, either from an extrinsic or intrinsic source and 2) overuse of the organism. These are the causes of injury.

There are, however, some causally related factors that affect one's ability to withstand both internal and external forces and the stresses of use. The four causally-related factors to sport injury are:

1. Care for injuries
2. Coaching competence
3. Skill level
4. Conditioning

These factors are not original with me. They appeared in practically every report I read in preparation for this paper and I relied heavily on the research of physicians, athletic trainers, and physical therapists. I suspect that these factors

apply to both males and females engaged in sport. As a physical educator I wish to comment on each factor.

First proper medical care — this includes a medical examination prior to participation, trained medical personnel at practices as well as at games to attend minor injuries before they become significant injuries. The NAIRS data indicated that 50 percent of the college teams either had no one designated or depended on the coach to attend injuries (5:451). I suspect that the picture in high schools is even more grim. Anyone who has coached knows that the coach does not have time and often does not have the expertise to attend injuries. If I were a key player, I would not wish to rely on the coach's judgment for medical care. In some cases, I think his/her priority may be to keep the key player in the game rather than to care for the injury. I also suspect that females come out on the short end of the deal if there are insufficient medical personnel to attend both male and female events. In this case, females should direct their efforts toward equal treatment and, better yet toward better medical attention for all sport participants.

There is little doubt that the coaching competence for our athletic teams could be improved for both females and males. I am distressed that we must be admonished by the medical professions. And furthermore, I feel this is an indictment against professional preparation in physical education. We have sent, and are sending graduates into the public schools ill prepared to assume coaching

responsibilities that many of them must assume. Many women lack the experience and training for coaching at high levels competition. And in some cases, the men assigned to coach the girls' and women's teams would not be allowed to coach the boys because of their lack of experience. I hope this gap is closing. But still, women who aspire to coach or who are engaged in coaching, must take advantage of opportunities or make opportunities to improve their coaching skills.

The skill level phenomenon as related to injuries of females, I believe to be another accurate assessment by those in medical professions. The average female is subjected to a stereotyped role that is culturally and socially imposed. High levels of physical skill and prowess have not been valued and, therefore, not encouraged. Naturally, girls come to us less skilled and less motivated to attain high skill levels than their male counterparts. This too is changing, but it behooves us to be more attentive to fundamental skills, that are inherent in the various activities.

And finally, conditioning. Few will argue that conditioning is an integral part of coaching competence. Conditioning is closely related to skill level, but not the same as skill level. I am referring to weight training for strength, cardiorespiratory training, and conditioning exercises that include flexibility exercises. Again, females are victims of cultural and social expectations, but conditioning is one of the best insurance policies against injury and/or severity of injury. On my last coaching job in swimming, I found the weight training equipment bolted to the floor in the men's locker

room. The location of the equipment told me something about the general attitude toward weight training for the women's swim team in the 1960's. Of course, I was not overly concerned with injuries in swimming — but I was concerned about strength and cardiorespiratory conditioning. I gained access to those weights, but gaining access was only half of the battle. The swimmers had little inclination and motivation to train with weights. My training methods were truly suspect until about mid-season when the team had a 4-1 record. My swimmers were winning against competitors who had won against them in high school. They became believers.

I take exception to comments about inherent weaknesses of the female ankle and about the laxity (looseness) of female joints as causative factors in injuries of females. I know of no research evidence to support this statement for women or men. I strongly suspect that the ankles of a female are as well prepared structurally to withstand the forces she imposes, as the ankle of the male is prepared to withstand the forces he imposes. The difference in susceptibility to injury is rather in the supportive soft tissue — muscles, tendons, and ligaments. With reference to laxity or looseness, I do not know precisely what is meant. If the reference is to flexibility, then the case seems flimsy. Much evidence tends to indicate that lack of flexibility is frequently associated with injuries also. From an academic view, the ideal situation should be plenty of flexibility and plenty of strength in the supporting soft tissues.

If I were coaching today or in charge of females in sport, I would insist on general strength and cardiorespiratory endurance training. If the activity involved running as in track and basketball, I would pay particular attention to strength development in the quadricep-hamstring muscle groups, in ankle extension, flexion, pronation, and supination muscles, and in the abdominal muscles. I would spend a large proportion of my initial practice time on conditioning and continue conditioning for maintenance throughout the season

To summarize the key points related to incidence of injuries

1. Female College Gymnasts appear to be particularly vulnerable to injury.
2. Two-thirds of injuries occur in practice.
3. Females tend to be particularly susceptible to lower extremity injury, notably ankle sprains, shin splints, and patellofemoral syndrome.
4. Injuries in sport are sport-related, not sex-related.

We can never eliminate sport injuries, but improved attention to care of injuries, to coaching qualifications, to skill level, and to conditioning are important for injury prevention for both males and females. This attention is particularly important for females at this time when competitive sports are increasing for females. The final word has not been written on sport injuries for females. However, if we meet our responsibilities, the incidence of injury and the severity of injury can be reduced for all people in sport.

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